making Norwegian kings speak "the Danish tongue." These instances show how readily the name of the Angles might efface that of the Saxons even at an early date.

While such objections may be made to some of Mr. Chadwick's arguments, the method he has followed in tracing the origins of the English people is a sound one. He begins with what can be learned of the invading nations immediately after their settlement in Britain, and from this works back as far as possible into their previous history. A necessary result of the method, however, is that as the inquiry advances the evidence becomes more scanty, and the use of conjecture more and more obvious. For this there is no help, but it seems a little disproportionate to give only ninety pages to the English period and two hundred and fifty to the Continental, of which so little is known. These ninety pages contain four chapters, of which the first gives a survey of England in the sixth century, showing the extent of the conquest at that date. The West Saxon invasion, and that of Kent, are specially discussed in the following chapters, and the fourth is occupied with the question of the three nations referred to above. It includes some useful tables of early linguistic variations, and remarks on these, together with an account of the difference between Wessex and Kent in respect of the various classes of the community and their wergelds.

The very hypothetical character of Mr. Chadwick's inquiry does not do full justice to the great mass of interesting matter which he has brought together. A very wide range of reading and research underlies every chapter of it, and each point has evidently been the subject of much study and consideration. Many of his views are highly suggestive, and may yet lead to more certain results. In the meantime, the evidence produced does not seem sufficient to convict Bede of any essential error, or to modify in any important way the usual views on the subject.

W. A. Craigie.

THE RAINFALL OF NORTH GERMANY.

Die Niederschläge in den norddeutschen Stromgebieten. By Prof. G. Hellmann. In three volumes. Vol. i., pp. vi+386+140; vol. ii., pp. viii+722; vol. iii., pp. viii+872. (Berlin: Dietrich Reimer, 1906.) Price 60 marks.

DR. HELLMANN'S three volumes contain a wealth of information relating to the rainfall and allied phenomena in the North German river basins. The principal observations are elaborately reduced, and in many aspects very fully discussed. The significance of this rainfall in its wider relation as part of the world weather, and, as such, its probable correlation with solar changes, are investigated with the advantage of well-marshalled data.

The area specifically dealt with in the volume is extensive, consisting practically of the great plain which extends without interruption from the chain of mountain ranges in south Germany to the North Sea and the Baltic. The direction of the river flow and the precipitation of the country are very largely determined by this chain of mountains, which is part of the great water-shed of Europe. The conditions of the rainfall problem over such an area would seem to be fairly simple, and capable of being dealt with in general terms. The local conditions, however, as is usual, exercise a considerable influence, the "actual" varying widely from any "mean."

The three volumes may be taken as a summary of the meteorological work of many years in the department of rainfall measurement within the district named. Its fulness and painstaking completeness is such as is expected from the efficient State-supported meteorological organisation of Germany. Much of the data is from the numerous and evenly distributed stations, daily returns from which are made immediate use of for short-date forecasting.

The first volume is general, describing and discussing the data and results. This volume is divided into five sections, of which the first, in dealing generally with the observation material and the manner in which it has been obtained, discusses the distribution of stations and the quality of the observations themselves. The recognition of the influence on these of the type and position of the gauges used is of value. Such considerations affect the credentials of the older observations, a knowledge of the standing of which allows the full length of the record to be used safely or to be rejected where untrustworthy A long meteorological record is sometimes, like the curate's egg, merely good in parts. The ease of approximate rainfall measurement conduced to its early commencement, and very old records exist. Observations made at Breslau (1717–1727) gave an annual mean of 576 mm., which does not differ greatly from the modern value of 567 mm. A valuable bibliography of the history of rainfall measurement concludes this first part.

The amounts of rain and their reduction and intercomparison are next dealt with. The influence and value of smoothing curves by taking means is illustrated both by actual curves and by tables. Means for several stations, for periods varying from five to forty-five years, together with the "greatest differences" in each set of means, are obtained and compared. The standing of short-period means and the necessity of taking a long period to obtain a normal value become clear. A valuable table of monthly seasonal and annual means, both actual and percentage of mean year, is given in the text for nearly 100 stations. The distribution of rainfall in the year, from ten- and twenty-year means, is discussed and illustrated by curves for Königsberg and Stettin. Abnormal rains and thunderstorms are considered at some length, while material for further discussion is given in tables of great detail.

The reduction of the data is further extended in the next section of the volume to the problem of the determination of the expectancy of greatest rainfall and the probability of the number of rainy days of definite intensity. Various mean curves are used depending on periods of observation of from nineteen to forty-three years. Snowfalls are dealt with in re-

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lation to snowy days, and their number and distribution throughout the year are illustrated, as usual, with compact tables of mean values for a large number of stations. Mean first and last snowfalls, here effectively tabulated, are important factors in the estimation of the climate of any place.

To this point the work deals with general conditions and mean values drawn from the long and trustworthy records discussed. In the sequel, that most obvious fact about rainfall, its variability, receives attention. The outstanding and apparently abnormal features are discussed, and a very complete list of dry and wet seasons from 1851–1900 is here available for critical investigation. The attempt to correlate these changes with larger variables, cyclic or otherwise, is a most important work. The rainfall, considered in relation to the well-known sunspot period, seems to indicate that periods of maximum precipitation are bound up with maxima of sun's spotted area. The author, however, is not able to consider these directly related as cause and effect, while he suggests that Sir Norman Lockyer's views as to the importance of prominences and allied phenomena may be nearer the true relation. The reader is specially referred to Sir Norman Lockyer's "Report on Simultaneous Solar and Terrestrial Changes" as best setting forth the general relationship between these two classes of phenomena.

The second and third volumes contain tables of data arranged under observing stations in the river basins.

The work is a monument to the value of scientific organisation and industry, and illustrates the high worth of collecting long, trustworthy, and continuous meteorological records.

OUR BOOK SHELF.

The Zoological Record. Vol. xlii. Being Records of Zoological Literature relating chiefly to the Year 1905. Edited by D. Sharp. (London: Zoological Society, 1906.)

WITH this volume ends, at any rate for the present, the series of this invaluable work with which we have been so long familiar, for next year the amalgamation with the zoological section of the International Catalogue of Scientific Literature is to commence. One effect of this change will be to make a radical alteration in the abbreviations employed for the titles of zoological serials, a change which, from the point of view of the working naturalist, is distinctly to be deplored. Whether the new arrangement will give that relief to the recorders to which the editor alludes so confidently in the preface remains to be seen.

In the main, the present volume follows the same lines as its predecessors, and displays the usual high level of excellence. By a rigorous system of cutting down, it has, however, been found practicable to make a considerable reduction in the number of papers in the general section.

Owing to the retirement of one old and experienced member of the staff, it has been necessary that a new recorder should undertake the sections dealing with reptiles (inclusive of amphibians) and fishes, and it is unfortunate that the editor has not apparently realised that this new member of his team required more attention than the old stagers. To allude to a tithe of the serious and misleading errors in these two sections would be impossible, and we can only indicate a few of the most glaring. Geography seems a very weak point with this recorder. In the fish section, for instance, the Rio Negro is placed in Africa, while the eastern seas of the Russian Empire are included in Europe. Arabia in the reptile section comes under the heading of Africa, while in the fish section Muscat and Oman are placed in Asia. "Ophidia," too, is so placed and printed on p. 27 of the reptile record as to convey the idea that it stands for a country. It should also have been explained that "Riu-kiu" is the Chinese equivalent of "Liu-kiu" or "Loo-choo."

As to misprints, it might almost be said that their name is legion; but, as examples, it must suffice to notice *Epiorates* for *Epicrates*, *gandryi* for *gaudryi*, *Hoodwell* for *Hordwell*, *Malaclemmys* for *Malacoclemmys*, and *Tyrranosaurus* (repeated in the list of new genera) for *Tyranosaurus*. In the case of a large number of new species of reptiles the localities are omitted, while many papers quoted in the title-list are not referred to in the subject-index. None of the genera included in the Percidæ really belongs to that group.

The other recorders seem, for the most part, to have done their work well, although it would have looked better if the somewhat long list of corrigenda to the mammal record had not been required.

R. L.

The Principles of Horticulture. A Series of Practical Scientific Lessons. By Wilfred Mark Webb. Pp. 136. (London: Blackie and Son, Ltd., 1907.) Price 2*s*.

THE experience of the author as a former teacher and demonstrator in the Essex County Council School of Horticulture has served him in good stead. He puts a plant into the hands of the pupil, shows him how to study it, indicates to him what there is to be learnt from it, both as to external form and internal function, and having thus rendered help in the preliminary stages leaves the pupil to make himself master of further details by his own exertions.

We rather doubt the advantage of beginning microscopical work at so early a stage, and should prefer to defer the investigation of the minute anatomy of a plant until the pupil has become familiarised with the facts of morphology. The search for sieve-plates and companion cells might well be left until the pupil has familiarised himself with morphology and classification. Stress is very properly laid on the importance of drawing, as every student soon finds the great help of sketches of even the roughest kind, provided that they show what the draughtsman saw or intended to see. Accuracy of detail rather than artistic effect is what should be aimed at, and it is a matter of surprise to see the excellent representations which pupils make after very little practice. The illustrations in the present book afford a good example of our meaning; they show what they are intended to show, though they are not pictures. A list of the natural families, arranged according to the system of Engler, is given. For the purposes of the beginner it would, we think, have been better to have picked out some dozen or score of the most important orders, and to have omitted a mass of detail not required by the average student and not full enough for those who desire more complete information.

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